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PHOTOGRAPHIC
INTERPRETATION
REPORT

NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

VHF/UHF COMMUNICATIONS ANTENNAS TYURATAM MISSILE TEST CENTER AND DOWNRANGE TRACKING FACILITIES

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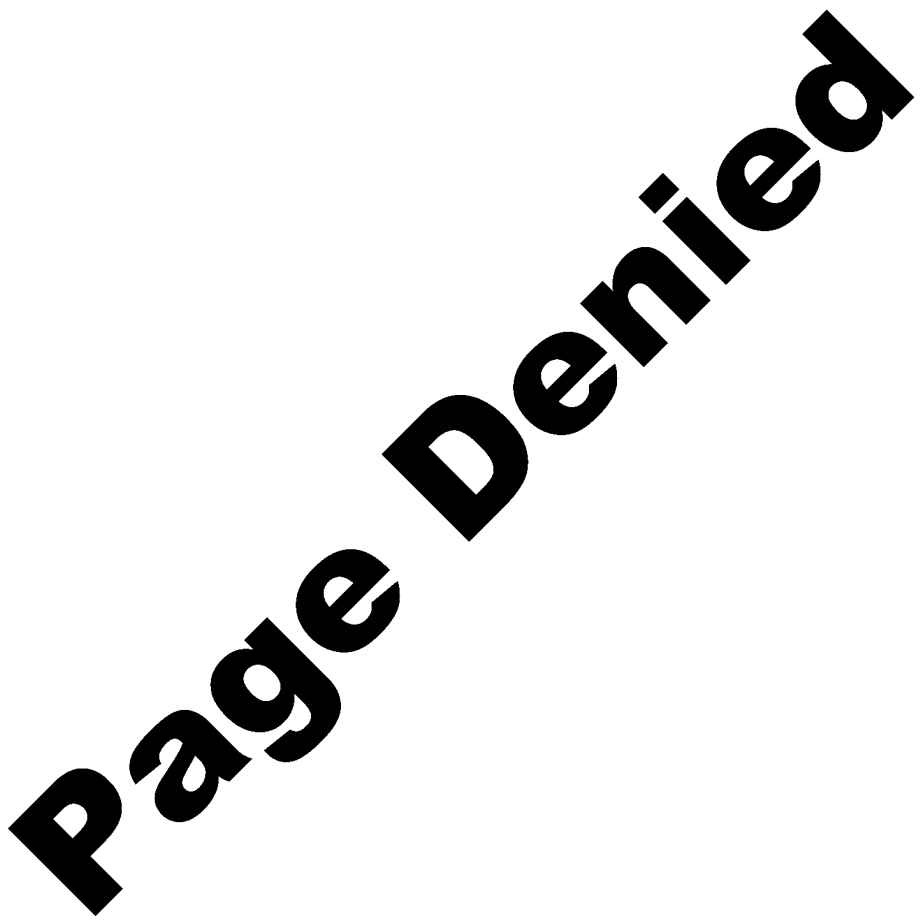

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INSTALLATION OR ACTIVITY NAME					COUNTRY
VHF/UHF Communications Antennas, Tyuratam Missile Test Center and Downrange Tracking Facilities					UR
UTM COORDINATES	GEOGRAPHIC COORDINATES	CATEGORY	BE NUMBER	COMIREX NO.	NIETB NO.
NA	See below	See below	See below	See below	See below
MAP REFERENCE					
See below					
LATEST IMAGERY USED		NEGATION DATE (If required)			
See below		NA			

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INSTALLATION NAME	GEOGRAPHIC COORDINATES	USATC, 200 SHEET NUMBER *
Tyuratam ESV Tracking Facility	45-54-22N 063-20-35E	M0246-13HL, 6th ed, Sep 67
Tyuratam Communications Facility 1 (HF)	45-50-21N 063-20-00E	M0246-13HL, 6th ed, Sep 67
Tyuratam Communications Facility 2 (HF)	45-36-48N 063-16-25E	M0246-13HL, 6th ed, Sep 67
Tyuratam Communications Facility 3 (TV/MW)	45-38-20N 063-20-00E	M0246-13HL, 6th ed, Sep 67
Tyuratam Msl Test Ctr SAM Site B08-2	46-01-42N 063-55-51E	M0246-14HL, 3d ed, Jul 67
Tyuratam Msl Test Ctr SAM Site B13-2	45-49-11N 063-43-41E	M0246-13HL, 6th ed, Sep 67
Tyuratam Msl Test Ctr SAM Site B21-2	45-43-07N 063-19-40E	M0246-13HL, 6th ed, Sep 67
Tyuratam Msl Test Ctr SAM Site B32-2	46-05-09N 063-14-05E	M0246-13HL, 6th ed, Sep 67
Tyuratam SAM Complex B23-5	45-46-57N 063-12-28E	M0246-13HL, 6th ed, Sep 67
Tyuratam Air Warning Radar Facility	45-53-03N 063-26-12E	M0246-13HL, 6th ed, Sep 67
Tyuratam Tracking Facility 1	46-55N 063-25E	M0246-08SL, 2d ed, Aug 67
Tyuratam Tracking Facility 2	46-17-15N 064-51-44E	M0246-14SL, 3d ed, Jul 67
Tyuratam Tracking Facility 3	50-14N 065-10E	E-5, 3d ed, May 66 Scale 1:1,000,000 (UNCLASSIFIED)
Tyuratam Tracking Facility 4	48-10N 068-33E	M0237-25HL, 1st ed, Feb 62
Tyuratam Tracking Facility 5	51-53-30N 067-20-10E	M0237-04HL, 3d ed, Nov 68
Tyuratam Tracking Facility 6	50-17N 071-45E	E-6, 2d ed, Apr 67, Scale 1:1,000,000 (UNCLASSIFIED)
Sary-Shagan ESV Tracking Facility	45-53-24N 073-37-08E	M0245-15HL, 3d ed, Apr 66
Kolpashevo ESV Tracking Facility	58-19-45N 082-53- 00E	D-5, 1st ed, Nov 63, Scale 1:1,000,000 (UNCLASSIFIED)
Yeniseysk ESV Tracking Facility	58-26-40N 092-16-20E	D-6, 1st ed, Mar 68, Scale 1:1,000,000 (UNCLASSIFIED)
Ulan-Ude ESV Tracking Facility	51-52-20N 107-55-40E	M0201-01SL, 3d ed, Jan 68 and sheet M0201-02SL, 3d ed, Jun 68
Galenki ESV Tracking Facility	44-01-20N 131-45-40E	M0282-21HL, 4th ed, Dec 65
Khutor ESV Tracking Facility and Krug Facility 2	53-06-05N 158-24-40E	M0194-17HL, 4th ed, Apr 65
Uka Hen Egg/Kamchatka Impact Tracking Facility A	57-56N 162-01E	M0132-14SL, 3d ed, Dec 66
Tyuratam MTR-Kamchatka Impact Tracking Facility B	56-51-00N 161-18-00E	M0132-19HL, 2d ed, Apr 68
Tyuratam MTR-Kamchatka Impact Tracking Facility C	57-11-00N 161-23-00E	M0132-19HL, 2d ed, Apr 68
Tyuratam MTR-Kamchatka Impact Tracking Facility D	57-08-30N 162-46-30E	M0132-19HL, 2d ed, Apr 68, and Sheet 0132-20A, 1st ed, Apr 59

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INSTALLATION NAME	GEOGRAPHIC COORDINATES		USATC, 200 SHEET NUMBERS
Tyuratam MTR-Kamchatka Impact Tracking Facility E	57-16N	162-45E	M0132-14SL, 3d ed, Dec 66 and Sheet M0 132-19HL, 2d ed, April 68
Tyuratam MTR-Kamchatka Impact Tracking Facility F	57-35N	162-09E	M0132-14SL, 3d ed, Dec 66 and Sheet M0132-19 HL, 2d ed, Apr 68
Tyuratam MTR-Kamchatka Impact Tracking Facility G	57-06N	162-05E	M0132-19HL, 2d ed, Apr 68
Tyuratam-Kamchatka Impact HF Commo 1	56-18-25N	160-51-35E	M0132-24HL, 3d ed, Apr 69
Tyuratam-Kamchatka Impact HF Commo 2	56-15-50N	160-47-38E	M0132-24HL, 3d ed, Apr 69

*All sheets 1:200,000 (SECRET/No Foreign Dissem Except UK, Canada Australia, & NZ) except as otherwise noted.

ABSTRACT

Very high frequency (VHF) and ultrahigh frequency (UHF) communications antennas have been identified at the ESV (earth satellite vehicle) tracking facility, communications facilities 1, 2, and 3, four SA-2 sites, the SA-5 complex, and the air warning radar facility at the Tyuratam Missile Test Center (TTMTC). FORK REST-type VHF communications antennas are present at Tyuratam tracking facility 2, and possibly at Tyuratam tracking facilities 1 and 4. Various types of VHF/UHF communications antennas also have been identified at five ESV facilities east of TTMTC which may be used as mid-range tracking facilities. Other VHF/UHF communications antennas have been identified at two of the seven impact tracking facilities and at the Tyuratam-Kamchatka impact high-frequency (HF) communications facilities.

This report contains a table summarizing the VHF/UHF communications antennas at TTMTC and its near-range, mid-range, and impact area tracking facilities, four location maps, and large-scale photographs of representative facilities.

INTRODUCTION

VHF/UHF communications antennas are located at the rangehead and at some of the near-range, mid-range, and terminal or impact tracking facilities on the Tyuratam Missile Test Range. The antenna types which are identified are the FORK REST-type VHF antenna, located at rangehead facilities, and at some of the near-range, mid-range, and terminal tracking facilities; and R-400-type microwave equipment at the rangehead, at several of the mid-range tracking facilities, and at the communications facilities associated with the terminal tracking facilities. Other VHF/UHF communications antennas identified are MERCURY PLATE antennas at the rangehead and troposcatter antennas and probable MERCURY GRASS antennas at two of the mid-range tracking facilities.

HF communications antennas are also present at several of the facilities which make up the Tyuratam Missile Test Range, although these antennas are not considered in this report.

BASIC DESCRIPTION

The following description of VHF/UHF communications antennas at TTMTC and its associated downrange tracking facilities is separated into sections on the rangehead, near-range tracking facilities, mid-range tracking facilities, and terminal tracking facilities. A summary of the VHF/UHF communications antennas at each of the facilities is presented in Table 1. In most cases, however, the interpretability of the photography was inadequate to determine precise antenna azimuths, and thus establish specific correspondents.

Tyuratam Missile Test Center Rangehead

VHF/UHF communications antennas are present in the instrumentation and tracking section of the ESV tracking facility, communications facilities 1, 2, and 3, four SA-2 sites, the SA-5 complex, and the air warning radar facility (Figure 1).

There are three masts supporting MERCURY PLATE reflectors at the instrumentation and tracking section of the Tyuratam ESV tracking facility (Figure 2). From east to west, the first mast has two reflectors oriented approximately south-southeast. This pair may communicate with the MERCURY PLATE antennas at

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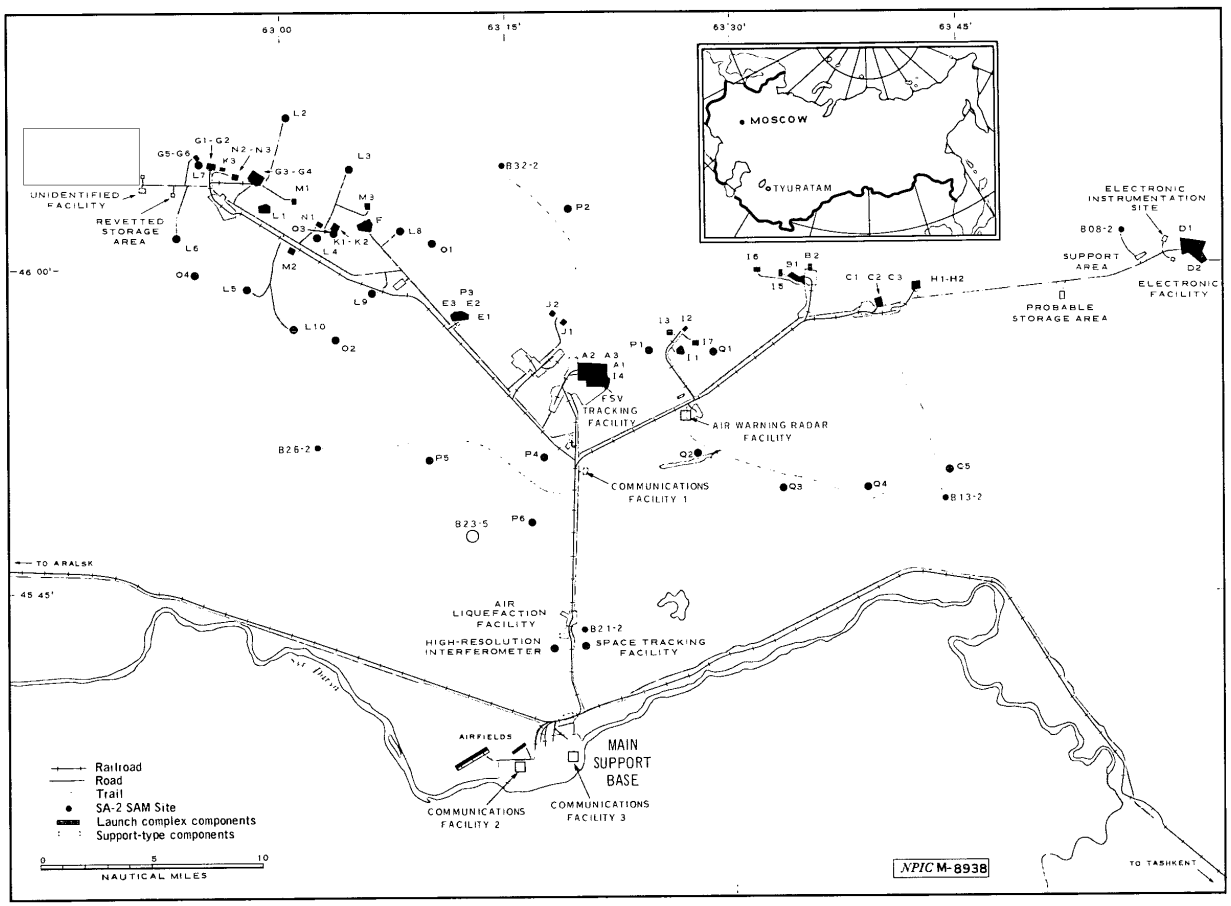

FIGURE 1. LOCATION OF THE VHF/UHF COMMUNICATIONS ANTENNAS, TTMTC

Table 1. VHF/UHF Communications Antennas at TTMTC Rangehead, Near, Mid, and Terminal Tracking Facilities

INSTALLATION NAME	GEOGRAPHIC COORDINATES	ANTENNA TYPE & NUMBER	REMARKS
Tyuratam ESV Tracking Facility	45-54-22N 063-20-35E	1 dual MERCURY PLATE antenna 2 single MERCURY PLATE antennas	See Figure 2 for mast heights
Tyuratam Communications Facility 1 (HF)	45-50-21N 063-20-00E	3 FORK REST-type VHF antennas	
Tyuratam Communications Facility 2 (HF)	45-36-48N 063-16-25E	3 FORK REST-type VHF antennas	
Tyuratam Communications Facility 3 (TV/MW)	45-38-20N 063-20-00E	1 dual MERCURY PLATE antenna 1 prob commo tower (poss VHF/UHF)	See Figure 3 for mast heights
Tyuratam Msl Test Ctr SAM Site B08-2	46-01-42N 063-55-51E	1 R-400-type microwave antenna	Mast
Tyuratam Msl Test Ctr SAM Site B13-2	45-49-11N 063-43-41E	1 R-400-type microwave antenna	Mast
Tyuratam Msl Test Ctr SAM Site B21-2	45-43-07N 063-19-40E	1 R-400-type microwave antenna	Mast
Tyuratam Msl Test Ctr SAM Site B32-2	46-05-09N 063-14-05E	1 R-400-type microwave antenna	Mast
Tyuratam Sam Complex B23-5	45-46-57N 063-12-28E	1 R-400-type microwave antenna	Mast
Tyuratam Air Warning Radar Facility	45-53-03N 063-26-12E	2 FORK REST-type VHF antennas	
Tyuratam Tracking Facility 1	46-55N 063-25E	2 poss FORK REST-type VHF antennas	
Tyuratam Tracking Facility 2	46-17-15N 064-51-44E	4 FORK REST-type VHF antennas	
Tyuratam Tracking Facility 3	50-14N 065-10E	No antennas discernible	
Tyuratam Tracking Facility 4	48-10N 068-33E	2 poss FORK REST-type VHF antennas	
Tyuratam Tracking Facility 5	51-53-30N 067-20-10E	Undetermined	
Tyuratam Tracking Facility 6	50-17N 071-45E	Undetermined	
Sary-Shagan ESV Tracking Facility	45-53-24N 073-37-08E	None discernible	
Kolpashevo ESV Tracking Facility	58-19-45N 082-53-00E	2 troposcatter antennas	
Yeniseysk ESV Tracking Facility	58-26-40N 092-16-20E	1 R-400-type microwave tower 4 prob VHF antennas	
Ulan-Ude ESV Tracking Facility	51-52-20N 107-55-40E	2 FORK REST-type VHF antennas 1 R-400 microwave tower	R-400 tower
Galenskiy ESV Tracking Facility	44-01-20N 131-45-40E	5 tower-mounted VHF antennas 1 R-600 microwave tower	R-600 tower
Khutor ESV Tracking Facility and Krug Facility 2	53-06-05N 158-24-40E	4 R-400-type microwave tower (2 prob) 1 FORK REST-type VHF antenna 4 prob MERCURY GRASS-type VHF antennas 5 vertical dipole antennas	R-400 microwave tower in Khutor HF communications facility (transmitting)
Uka Hen Egg/Kamchatka Impact Tracking Facility A	57-56N 162-01E	2 FORK REST-type VHF antennas 1 Unidentified mast-mounted antennas	
Tyuratam MTR-Kamchatka Impact Tracking Facility B	56-51-00N 161-18-00E	No antennas discernible	
Tyuratam MTR-Kamchatka Impact Tracking Facility C	57-11-00N 161-23-00E	2 FORK REST-type VHF antennas	
Tyuratam MTR-Kamchatka Impact Tracking Facility D	57-08-30N 162-46-30E	No antennas discernible	
Tyuratam MTR-Kamchatka Impact Tracking Facility E	57-16N 162-45E	No antennas discernible	
Tyuratam MTR-Kamchatka Impact Tracking Facility F	57-35N 162-09E	No antennas discernible	
Tyuratam MTR-Kamchatka Impact Tracking Facility G	57-06N 162-05E	No antennas discernible	
Tyuratam-Kamchatka Impact HF Commo 1	56-18-25N 160-51-35E	3 FORK REST-type VHF antennas	
Tyuratam-Kamchatka Impact HF Commo 2	56-15-50N 160-47-38E	3 FORK REST-type VHF antennas 1 prob R-400 type antenna	

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Tyuratam communications facility 3. The second mast supports a single reflector, oriented approximately northeast. The third mast also supports a single reflector, oriented approximately north-northeast. The latter two antennas appear to be directed toward correspondents on the eastern end of the rangehead. However, no MERCURY PLATE antennas were identified at the facilities in that area.

Tyuratam communications facilities 1 and 2 (HF) each contain three FORK REST-type VHF antennas, positioned near the respective control buildings. In addition to communicating with the near-range tracking facilities, the FORK REST-type antennas may also provide a communications link between the HF transmitting and receiving facilities at TTMTC.

A mast occupied by two MERCURY PLATE reflectors oriented approximately north is on the west side of the television tower at communications facility 3 (Figure 3). No microwave antennas are discernible on the television tower itself. A probable communications tower is adjacent to the east side of the control building. Although the specific antenna type and configuration on the tower cannot be determined, it is possibly in the VHF/UHF frequency range.

Tyuratam Missile Test Center SAM sites B08-2, B13-2, B21-2, and B32-2 and SAM complex B23-5 (Figure 4) are each equipped with R-400-type microwave

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antennas. No R-400-type equipment could be identified at the air warning radar facility, although it would probably be a part of the air defense communications network. The only ground-to-ground VHF/UHF communications antennas identified at the air warning radar facility are two FORK REST-type VHF antennas.

TTMTC Near-Range Tracking Facilities

There are six near-range tracking facilities, arranged in pairs opposite each other along the line of flight of missiles launched to the Kamchatka and Pacific impact areas (Figure 5). The tracking facilities are from 59 to 429 nautical miles (nm) northeast of the Tyuratam rangehead and contain optical and radar tracking and telemetry receiving equipment.

Four FORK REST-type VHF antennas have been identified at Tyuratam Tracking Facility 2 (Figure 6). Two possible FORK REST-type VHF antennas may be present at both tracking facilities 1 and 4. No communications antennas are discernible at tracking facility 3 which may be abandoned. Tracking facilities 5 and 6 have not been observed on large-scale photography with interpretability adequate to identify VHF/UHF antennas.

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ESV Facilities

A network of 11 earth satellite vehicle (ESV-FLIM FLAM associated) facilities throughout the USSR provides command/control of Soviet near-space orbital events, and, in some cases, command/control for the Molniya communications satellite (Figure 7). Some of these facilities in central and eastern USSR may be in a position to collect tracking and telemetry data on missiles launched from Tyuratam, depending on the launch azimuth. The tracking and telemetry components at each of these facilities typically include FLIM FLAM buildings, SHIP WHEEL radars, and various types of telemetry receiving antennas.

The HF communications antennas at each of the facilities are the principal means of long distance radio communication. Details of these antennas and of the facilities themselves may be found in the reports referenced with the individual facilities below.

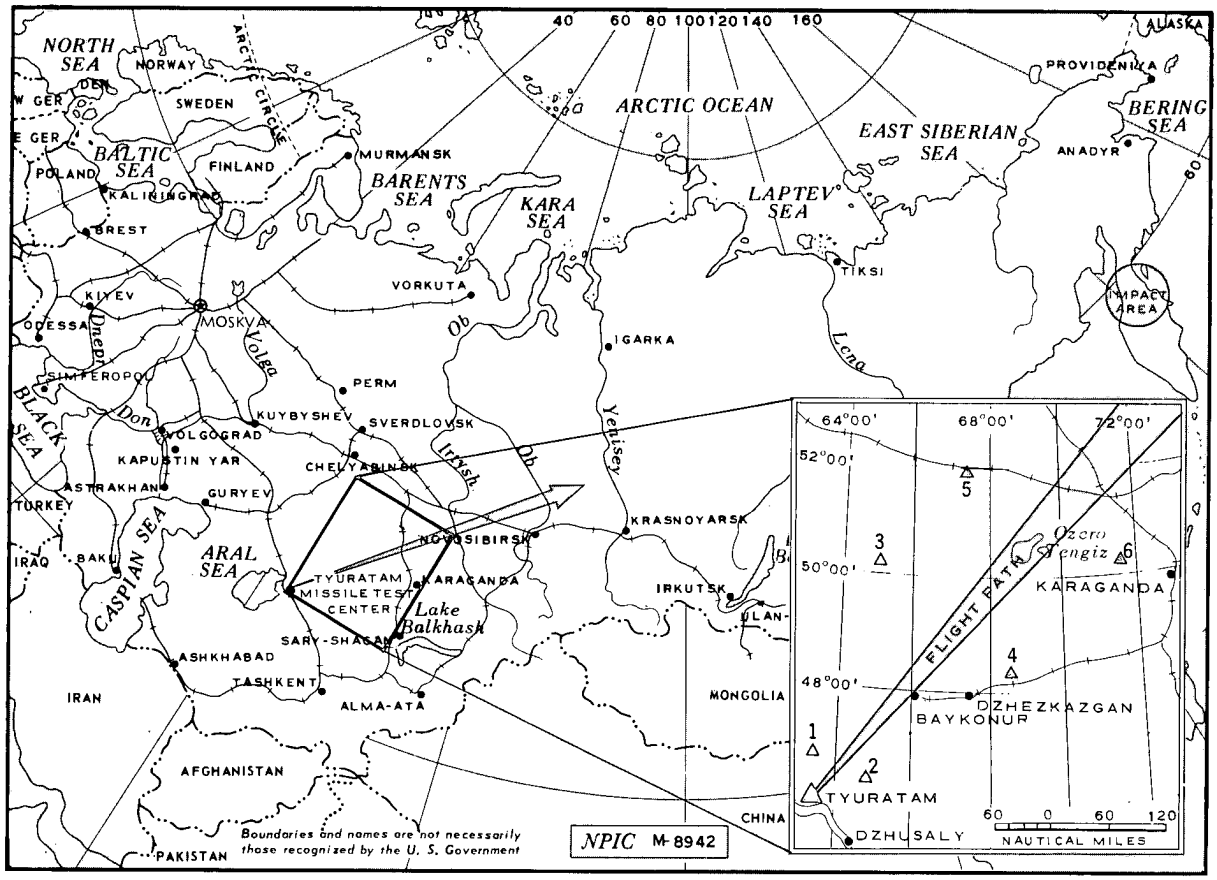

FIGURE 5. LOCATION OF VHF/UHF COMMUNICATIONS ANTENNAS AT TTMTC NEAR-RANGE TRACKING FACILITIES

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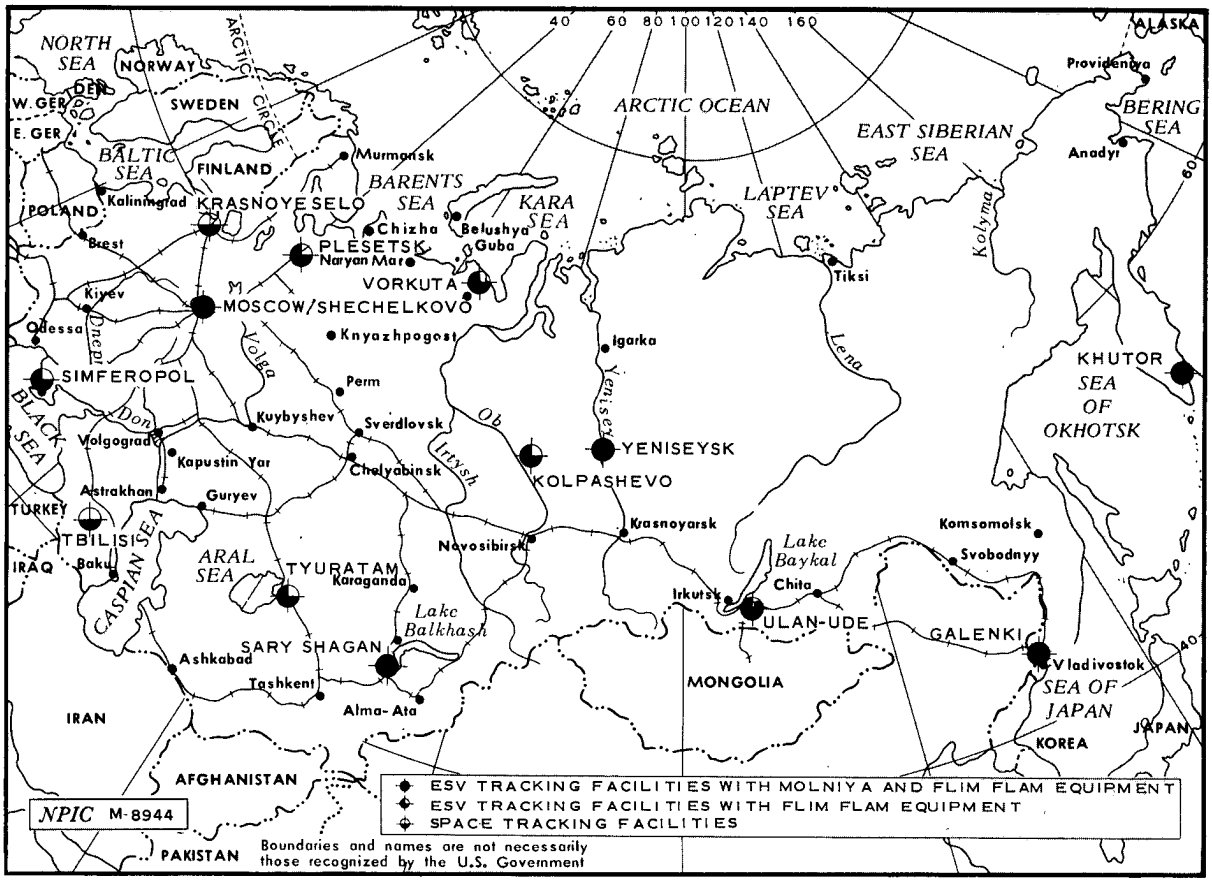

FIGURE 7. LOCATION OF VHF/UHF COMMUNICATIONS ANTENNAS AT SELECTED ESV TRACKING FACILITIES

Sary-Shagan ESV tracking facility.[2] No VHF/UHF communications antennas are discernible at the facility.

Kolpashevo ESV tracking facility.[3] Two troposcatter antennas (type undetermined) are present within the communications area of the facility. The antennas are oriented on an azimuth of 147 degrees toward Tomsk in central USSR. No other VHF/UHF communications antennas are discernible at the facility on available photography.

Yeniseysk ESV tracking facilities.[4] An R-400-type microwave tower is in the operations area, and four probable VHF antennas are in the support area.

Ulan-Ude ESV tracking facility.[5] Two FORK REST-type VHF communications antennas and one R-400-type microwave antenna are located on the western edge of the HFcommunications antenna field.

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Galenki ESV tracking facility.[6] Three tower-mounted VHF antennas and an R-600 microwave tower are in the HF receiving component of the facility. Two tower-mounted VHF antennas are in the HF transmitting component of the facility 5 nm southwest. The VHF antennas may be used to provide a communications link between the HF receiving and transmitting facilities.

Khutor ESV tracking facility and Krug facility 2.[7] An R-400-type microwave communications system probably interconnects all major components of the ESV tracking facility. A probable R-400-type microwave tower is in both the Molniya and FLIM FLAM areas. An R-400-type microwave tower, with two dishes, is in the eastern HF communications facility (receiving), and a fourth R-400-type tower is in the Khutor HF communications facility (transmitting). The HF transmitting facility is located 10 nm north-northwest of the ESV tracking facility, but is associated with the previously mentioned HF receiving facility on the basis of similar antenna azimuths at each.

Additional VHF communications antennas include a FORK REST-type antenna and four probable MERCURY GRASS antennas in the eastern HF communications facility (receiving), and five vertical dipole antennas. The latter are each cable connected to a transmitter building in the western end of the FLIM FLAM area.

TTMTC Impact Tracking Facilities

The impact area tracking facilities for the Tyuratam missile test range are located approximately 3,400 nm downrange on the Kamchatka peninsula and are designated A through G (Figure 8). The Uka HEN EGG/Kamchatka impact tracking facility A is the largest of the seven and probably serves at the logistical base for several of the remote outstations. The command/control and long distance HF communications facilities are located at Klyuchi.

Two FORK REST-type VHF antennas are present at tracking facilities A and C (Figure 9). No communications antennas were discernible at tracking facilities B, D, E, F, and G.

Tyuratam-Kamchatka impact HF commo 1 (Figure 10) and Tyuratam-Kamchatka impact HF commo 2 at Klyuchi each contain three FORK REST-type VHF antennas. There is also an R-400-type microwave antenna at the latter facility.

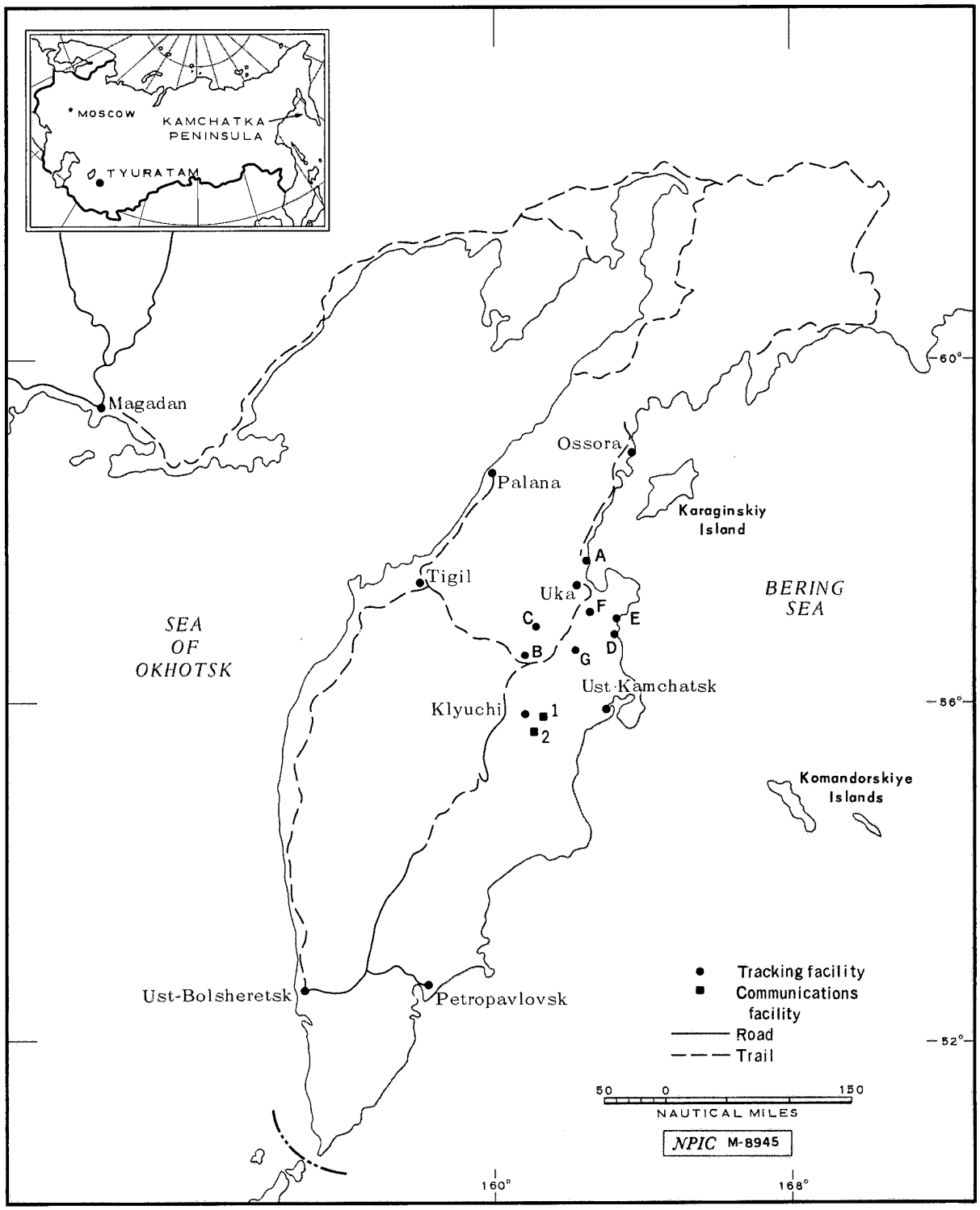

FIGURE 8. LOCATION OF VHF/UHF COMMUNICATIONS ANTENNAS AT TTMTC IMPACT AREA TRACKING AND COMMUNICATIONS FACILITIES

Next 1 Page(s) In Document Denied

References (cont'd)

DOCUMENTS

1. NPIC. *Selected TTMTC Near-Range Tracking Facilities, USSR,* Oct 67 (TOP SECRET CHESS RUFF CODEWORD-
2. NPIC. *Sary Shagan ESV Tracking Facility, USSR,* Nov 68 (TOP SECRET CHESS RUFF)
3. NPIC. *Kolpashevo ESV Tracking Station* (*Kolpashevo ESV Tracking Facility*), Oct 69 (TOP SECRET CHESS RUFF
4. NPIC. *Yeniseysk ESV Tracking Facilities,* May 69 (TOP SECRET CHESS
5. NPIC. *Ulan-Ude ESV Tracking Facility,* Sep 69 (TOP SECRET RUFF
6. NPIC. *Galenki ESV Tracking Facility,* Jan 69 (TOP SECRET CHESS RUFF
7. NPIC. *Khutor ESV Tracking Station A (Khutor ESV Tracking Facility and Krug Facility 2*), Jul 69 (TOP SECRET CHESS RUFI

MAPS AND CHARTS

ACIC. ONC, Sheet D-5, 1st ed, Nov 63; Sheet D-6, 1st ed, Mar 68; Sheet E-5, 3d ed, May 66; and Sheet E-6, 2d ed, Apr 67, scale 1:1,000,000 (UNCLASSIFIED)

ACIC. USATC 200, Sheet M0132-14SL, 3d ed, Dec 66, scale 1:200,000 (SECRET/

SAC. USATC 200, Sheet M0132-19HL, 2d ed, Apr 68, scale 1:200,000 (SECRET/

PACAF. USATC 200, Sheet M0132-24HL, 3d ed, Apr 69, scale 1:200,000 (SECRET/

SAC. USATC 200, Sheet 0132-20A, 1st ed, Apr 59, scale 1:200,000 (SECRET/

NAVY. USATC 200, Sheet M0194-17HL, 4th ed, Apr 65, scale 1:200,000 (SECRET

References (cont'd)

MAPS AND CHARTS (cont'd)

SAC. USATC 200, Sheet M0201-01SL, 3d ed, Jan 68, scale 1:200,000 (SECRET

SAC. USATC 200, Sheet M0201-02SL, 3d ed, Jun 68, scale 1:200,000 (SECRET

SAC. USATC 200, Sheet M0237-04HL, 3d ed, Nov 68, scale 1:200,000 (SECRET

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ACIC. USATC 200, Sheet M0245-15HL, 3d ed, Apr 66, scale 1:200,000 (SECRET

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NAVY. USATC 200, Sheet M0282-21HL, 4th ed, Dec 65, scale 1:200,000 (SECRET

REQUIREMENT

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